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THE MONIST

ERNST HEINRICH HAECKEL.

AN APPRECIATION.

THE overwhelming disaster which has befallen Germany seems to have drawn into its vortex many of her leading thinkers. At least their death is a sad coincidence. Foremost among the recent victims of the grim reaper are her three preeminent scientists, Paul Ehrlich, Emil Fischer, and Ernst Haeckel. Ehrlich was universally recognized as the world's foremost therapist, and Fischer is lauded by Professor Harrow of Columbia University "as the greatest organic chemist of all times," but undoubtedly the most popular and widely known of the three was Haeckel, the "sage of Jena," who died on the 8th of August in his 86th year. Of him alone can it be said that he had reaped the full fruition of his life and labors. He no longer was a merely national figure, his writings had been translated into the languages of all civilized races and were sold in hundreds of thousands of copies. His influence upon the most advanced thinkers of our own country has been such as to challenge inquiry. But the wealth of ideas with which he enriched the world is so overwhelming that it is impossible, even approximately, to do him justice in a short sketch.

I met him for the last time in the summer of 1905, while visiting the Jena Zoological Institute, his own magnificent creation, situated in one of the most charming suburbs of the quaint university town, in the midst of stately trees and

dominated by majestic silence. In spite of his years he had remained erect and elastic, reminding me of his athletic stunts on the horizontal bar and his diving feats in the ocean; even his somewhat high-pitched voice still sounded remarkably young. Much lecturing had not entirely removed the peculiarities of his Potsdam local dialect. Moreover, Professor Haeckel had never cultivated the widely practised academic habit of inspiring youthful listeners by means of skilfully and diplomatically developed sentences. He always spoke to the point, he chatted—to the point, but was never dull.

And as was his personality so was his environment. The Zoological Institute is a faithful expression of the artistic side of his nature. In the large entrance-hall six prominent tablets meet our eyes announcing in lapidary style the names of Aristotle, Linnæus, Lamarck, Cuvier, Johannes Müller, and Darwin: the confession of faith of the *genius loci*. Darwin's plastic head, laurel-crowned, adorns the library together with a similar memento of his great apostle: Haeckel's marble bust executed by the sculptor Kopf in Rome. All the walls of the great staircase are veritably alive with pictures, copies of his unique aqua-relles representing the fruits of his travels: tropical landscapes, gruesome gigantic skeletons, and, by way of contrast, the wonders of his beloved sea-fauna, the unicellular microscopic organisms known scientifically as Radiolaria and Rhizopoda and distinguished for their calcareous and siliceous skeletons of endless variety and wondrous delicacy. Thousands of these were discovered and collected by the great naturalist himself, particularly in the Southern seas. The symmetrical arrangement and composition of the thousand and one miniature parts of these skeletal scaffoldings represent most phantastic asteroid groups and suggest many new motives to the decorative artist. The Institute itself has already carried out some of these sug-

gestions by decorating its plafonds with beautifully colored designs of siphonophores, those polymorphous colony-forming groups of oceanic hydrozoans which are a constant delight to the beholder.

The most splendid results of Haeckel's investigations are, however, found in the Zoological Museum where even the layman may learn something about the evolutionary theory. A gigantic model of the gastrula larva, the earliest embryological stage common to all multicellular animals, arouses at once our attention and bids us to observe further the genealogically arranged groups of animals and their transitional forms, especially the Australian duckbill, porcupine ant-eaters, and lungfish, which occupy significant positions as connecting links in the genealogical exhibitions of the Museum. But the most important material for the demonstration of the fundamental principles of embryology, one of which—the biogenetic law—Haeckel has condensed in the well-known formula "Ontogenesis is the recapitulation of Phylogenesis," is contained in thousands of microscopic slides. These vast and valuable scientific treasures of the Institute were gathered and constantly enlarged by Professor Haeckel on his extended journeys through India, Algiers, Madeira, Ceylon, Portugal, Italy, and wherever the opportunity for rich finds offered itself. Surely, under such a teacher and in such an environment study becomes a delight, and many brilliant and ambitious young men, litterateurs like the Hauptmanns and Wilhelm Boelsche, philosophers, theologians, medical and biological students—among them the foremost biologists of to-day—gathered in the quiet Tusculum of the Zoological Institute to receive inspirations which lasted a lifetime.

Out of this unique and resplendent frame the image of the great naturalist shines forth with luminous clarity. Here Ernst Haeckel had found the central attraction of his life and activity, admired both for the results of his

research and the enthusiastic flight of his hypotheses. Darwinism with all that this term implies constitutes the chief source of his working methods and of his results. When in the year 1859, after long, quiet, and industrious labors, the hermit of Down in his modest way and almost under compulsion enunciated his views on the origin of species they found an almost immediate response, in the midst of a general frosty silence, in the enthusiastic endorsement from Jena.

Haeckel was twenty-six years of age when Darwin's epoch-making work appeared. As early as in his twelfth year he had shown a decided preference for the study of the natural sciences, but he obeyed the wish of his father, himself a practising physician, and studied medicine. In 1857, when only twenty-three years of age, he opened an office in Berlin. While pursuing his studies in Würzburg, Berlin, and Vienna, he had come under the influence of Kölliker, Virchow, and Johannes Müller, then the three most eminent authorities in their respective spheres of histology, anatomy, and physiology; they stimulated his unusually receptive mind to an extraordinary degree. The mere practice of medicine became, therefore, more and more distasteful to him, so that we are not surprised to find him as early as 1861 as *Privatdocent* at the University of Jena, long known as the most fertile breeding-place of new and forceful ideas, the bulwark of free research.

In the short space of another year he was advanced to the position of *Professor extraordinarius* on the basis of his brilliant monograph on the Radiolaria, the first important fruit of his youthful investigations. In this work he gives full expression to his admiration of the Darwinian theory, stressing it with strong emphasis because his German colleagues had received it with much disfavor. Darwin had desired that his results should be subjected to a thorough test and looked "with special confidence to young

aspiring naturalists who will be capable of judging both sides of the question impartially," adding that, "Whoever is inclined to the view that species are inconstant will perform a great service to science by scrupulously acknowledging this conviction; for, only in this way can the mountain of prejudice be removed under which it lies buried." Haeckel declared that he completely agreed with this view and felt impelled to proclaim his conviction of the transmutability of species and the genealogical relation of all organisms. However, he expressed himself very cautiously, declaring that he did not consider all the claims of Darwin proven, criticizing especially the failure of the great naturalist to discuss the origin of the primitive organisms from which all others were derived. Darwin, he said, could not, in order to be consistent, assume a special act of creation for these lowest forms. Yet he admired the first real scientific attempt to view all the phenomena of the organic world from a single uniform standpoint and to replace unintelligible miracle by an intelligible natural law. Unfortunately, this courageous confession of the youthful zoologist was known only to the few specialists who had an interest in his monograph; hence it remained at first practically unknown. For all that, it became thenceforward the guiding principle of his whole life and the fundamental basis of his science, his art, his philosophy, and his religion, in short, of his *Welt- und Lebensanschauung*.

Haeckel was above all things a fearless guardian and champion defender of his science. During the storm and stress period of the new doctrine he was swordsman and standard-bearer at the same time. On the 19th of September, 1863, at the meeting of the "Society of German Physicians and Naturalists" at Stettin, he championed Darwin's theory of evolution for the first time in a public speech. With convincing logic and in classic diction—he

was a master of his native tongue—he presented its fundamental ideas, showing that all plants and animals of our time as well as all organisms which have ever lived on earth had not been created individually, each a species by itself—as we had been taught from childhood up—but had evolved gradually in the course of many millions of years, and in spite of their great diversity from a very few, perhaps from a single form, an extremely simple organism. Man must therefore first seek his forebears among the apelike mammals, then further back among the kangaroo-like marsupials, still further back in the so-called second period or Mesozoic age among the lizard-like reptiles, and finally in a still earlier period, in the Paleozoic age, among the primitive fishes. The evolution-theory of Darwin, Haeckel declared, will be of the same importance for organic nature as Newton's law of gravitation has been for inorganic nature. The young Jena professor was, however, unable to enthuse many of his hearers for the new doctrine. Especially the older leaders in biological science declared it untenable and foolish, not suspecting what folly they themselves were committing, for not many years afterward Haeckel became the leader in the combat and an army of enthusiastic followers gathered about him, the now far-famed German Darwin.

The great controversialist turned his words into deeds. In the year 1866 his first work of importance, *General Morphology*, appeared, making a profound impression, for it was at once recognized as the harbinger of a new era in biological science. To-day it is universally acknowledged as the dividing-mark between the pre-Darwinian and the modern age, presenting the ultimate conclusions of the Darwinian doctrine for the entire realm of biology. In it Haeckel undertook the reconstruction of the whole edifice of morphology from the foundation up, by showing that henceforth the investigation of the historic develop-

ment of the organisms inhabiting our earth, i. e., the study of phylogeny, the history of the tribe, must become the chief business of morphologists. To facilitate this, he took pains to work out the methods which would lead to that goal. The *General Morphology* contained, as it were, the program of his whole life-work out of which all his later productions grew.

The first attempt to bring the entire knowledge of the animal world into a logically arranged system was undoubtedly made by Bronn, the first translator of Darwin's *Origin of Species* into German, in his *General Zoology* which had appeared in 1850. Bronn was then still influenced by the botanist De Candolle, who, though progressive and later an ardent supporter of Darwin, had sought the *summum bonum* of biological science in purely systematic work, advocating a natural classification according to external characteristics; he had long been superseded by Schleiden's critique. Therefore, Bronn's book had lost its function as a legacy to coming generations even before it was in print.

Schleiden had assigned to botany the task of investigating the form and function of the cell; from his school came the stimulus for a new and timely system of zoological science, and the man who was called upon to apply the division of botany into morphology and physiology to the realm of zoology was Ernst Haeckel. But while Schleiden emphasized the importance of the embryological method and of the cell as the elementary organ of plants, Haeckel laid chief stress upon the theory of descent, using it as the Archimedian point from which he lifted the world of old methods off its hinges. He applied the evolutionary principle not only to the organic but also to the inorganic sciences, by basing his positive philosophical view—his "law of substance," which he posited as a fact—upon the assumption that we know nature in its entirety as a system

of moving forces which inhere in matter, compelling us to classify the totality of our knowledge according to the various kinds of motions. We must, therefore, distinguish two factors in the study of organisms, viz., forms and functions, which necessitates a differentiation of biology into morphology and physiology, a distinction already demanded for botany by Schleiden. Haeckel, however, went to his problem in a much more thoroughgoing fashion. His systematic mind tolerated no gaps. He not only undertook to clearly define the distinctly separate functions of the two biological branches but also so to arrange and group all the activities of the botanist and zoologist that they could be subsumed under those two chief categories. And he accomplished his task. He united in his system the two tendencies of his predecessors by deriving, on the one hand, his chief divisions from the fundamental principles of a popular philosophical theory of knowledge which made the system generally acceptable, and, on the other hand, subsumed under these divisions the sum total of contemporaneous science. Herein lies the true historical significance of Haeckel's work, and the eminently practical value of such a solution of the long-felt conflict fully explains why this system could control all natural science for four decades in spite of the fact that its philosophical foundation is very debatable.

Haeckel ascribed to the science of the evolving form of the organism the same value as to the science of the completed form and hence divided morphology into the two coordinated branches of anatomy and morphogeny or embryology. Further subdivisions of anatomy into the science of structure, or tectology, and in promorphology include the principle of differentiation of individual types, i. e., the presentation of Haeckel's theory of individuality which distinguishes six grades of organisms, the discussion of which would, however, lead us too far afield. The division

of morphogeny into embryology of individuals or ontogeny, usually called embryology proper, and embryology of tribes or phylogeny, completed Haeckel's far-reaching plan of a General Morphology.

The chief features of this he later embodied in his trenchant inaugural address on "The Growth and Task of Zoology," delivered in 1869, in the university assembly-hall at Jena, when he entered the Philosophical Faculty as *Professor ordinarius* and defined the duties and prerogatives of the new chair of zoology to which he had been appointed in 1865. He started out by characterizing the two kinds of systematic science "as the external classificatory system of the general public whose ideal of the biological sciences is a complete herbarium and zoological museum, and that system which in the natural classification of organisms recognizes the hypothetical expression of its real genealogical tree and in the approximate establishment of which it pursues a high and difficult scientific aim." He then continued: "The systematology of the first kind, viz., museum zoology and herbarium botany, as it has been largely pursued hitherto, hardly deserves the name of a science. For, every science as such must be able to produce a certain sum of general results and laws, it must strive to interpret phenomena and search to find its causes; it dare not be satisfied with the mere knowledge of single scattered facts. But the latter is quite surely the case with pure systematology. An exclusively descriptive natural history can never lay claim to being called a science True, descriptive systematology is just as indispensable as the collections themselves, and the whole application of zoological and botanical knowledge to practical life is dependent upon it. However, a practical and applied science is no science at all but an art, and we shall, therefore, have to consider the purely descriptive classification of plants and animals as an art like the practice of medi-

cine, pharmacy, and agriculture to which it, especially, renders service. Entirely different from this artificial method of work is that truly scientific systematology which presents the natural classification of the species of plants and animals as their true genealogical tree." This distinction embodies Haeckel's greatest and most enduring service to science.

Applying the results of embryology, with special emphasis on the biogenetic law, also to anthropology, he made the difficult attempt, obeying his passionate desire for ultimate conclusions, to outline the developmental history of the whole organic world and wrote a *Natural History of Creation* which appeared in 1868. Being of a popular nature, it went through many editions and was translated into at least fifteen foreign languages. This was followed in 1874 by a more scientific work on *Anthropogeny*, or the evolution of man proper. These books were discussed for years with extreme animation, but when after the lapse of almost a quarter of a century Haeckel gave a summary "On Our Present Knowledge of the Origin of Man" at the International Congress of Zoologists at Cambridge in 1898, he met with entire accord from this forum of international science.

Science demands above all things concrete proofs. We, therefore, find our Jena savant constantly and indefatigably at work in his laboratory, as is amply shown by his voluminous monographs on the embryology of the siphonophores and the calcareous sponges. Toward the end of the sixties embryology had through the epoch-making researches of the Russian biologist Kovalevsky gained the foreground of zoological investigation; however, only Haeckel saw the full significance of these discoveries and their importance for systematology. His interpretations of these new discoveries, therefore, advanced the development of the genealogical system of classification by leaps and bounds. On

the basis of Kovalevsky's and his own discoveries in the realm of invertebrate embryology, he worked out and established during the years from 1872 to 1884 the ingenious conception of his famous "gastræa theory." From the fertilization of all multicellular animals there develops after complete cell-division a primitive germinal structure which in all normal cases resembles a miniature thimble consisting of two layers of cells and a primitive mouth, or blastopore, along the margin of which the two cell-layers merge. This phase of the embryo's development is called the gastrula stage. From it gradually all the organs of the body develop. The systematic importance of the gastræa theory culminates in the following trenchant conclusion: "The whole animal kingdom is divided into two large groups separated by the gastrula form; one of these groups is composed of the primitive unicellular animals or Protozoa, and the other of the six higher tribes or phyla which are designated as germ-layer animals or Metazoa." This apparently simple and insignificant division of the animal kingdom has become of the greatest importance for the full understanding of the general relation of the animal phyla, for many of the later morphological discoveries find here their proper interpretation, expressed by the simple statement that all higher or more complex animals are derived from the common ancestral form of the gastræa which possess a monaxial body composed of two layers of cells, the ectoderm and the endoderm, and the cavity of which opens at one pole through the primitive mouth. Though the attempts of Haeckel to explain the relations between all the various individual types partly failed, they nevertheless led to a series of similar attempts which characterize the systematic efforts of subsequent years.

Within a further decade Haeckel published the astounding results of his extensive explorations in foreign lands and seas: a completed monograph on the Radiolaria of

which he discovered and named something like four thousand new species, an eloquent testimonial of his investigating genius as well as of the thoroughness of his linguistic knowledge. Counterparts of this work are his monograph on the Medusæ or jelly-fishes and his report on the results of the British Challenger expedition. But his most monumental production, in which he sums up the results of more than thirty years of scientific research, is his *Systematic Phylogeny*, published in three volumes from 1894 to 1896, a "sketch of the natural system or organisms on the phylogenetic basis" which contains the pedigrees of all the larger divisions of the animal and plant kingdom.

Haeckel's theories, however, did not find ready recognition, especially among the older scientists, while the more ambitious youth of Germany recognized in him a new prophet and leader. They flocked to his lecture-room and laboratories in large numbers, attracting quite a few foreigners who likewise looked upon Haeckel as the final architect of the evolutionary structure started by Copernicus, Kepler, and Newton, continued by Lyell and put under roof by Darwin and Wallace but illuminated and furnished by Spencer and Haeckel. Nevertheless, the Jena professor was attacked on all sides, especially after the principle of natural selection which he staunchly upheld had been declared insufficient as the chief factor in the explanation of the origin of species.

But even previously violent discussions had taken place. Especially at the golden jubilee meeting of the "Society of German Physicians and Naturalists" in Munich in 1877. Virchow, Pettenkofer, Nägeli, Waldeyer, and Haeckel, leaders in the biological thought of the times, were the chief combatants for and against the new doctrine of descent. It was a battle of the giants. Pettenkofer, the physiological chemist of Munich, spoke first, entirely ignoring the delicate subject. Waldeyer, the Berlin anatomist, fol-

lowed condemning Darwinism in unmeasured terms, whereupon Haeckel arose and delivered his first comprehensive public address on the theory of descent and its application to all spheres of life and knowledge, including education, morality, and religion. It was a fulminating speech arousing admiration and ire at the same time. Virchow answered; he counseled moderation but did not refrain from sharply criticizing Haeckel's view on the origin of the human race and his cellular psychology, protesting against its teaching in the schools and warning his hearers against the dangerous influence of such theories upon the constantly increasing demagogic intrigues of the Social Democrats. The deafening applause which followed easily showed the preference of the audience. Haeckel answered with a brochure entitled "*Freie Wissenschaft und freie Lehre*," the most brilliant production of his pen, but the dice had been cast, Haeckelism as such had, for a while at least, received a severe blow. Even his party organ *Kosmos* dared not defend him; on the contrary, it admonished its readers not to wound the nation's religious feelings, for, the tendency of the average man was then and is now to endorse what Darwinism destroys and look with indifference upon its constructive mission. In 1882 the publication of the magazine was discontinued.

The chief objection to Haeckel's dogmatism was his application of the theory of descent to the human race. He regarded the following as the last stages in man's ancestral line: (1) the earlier *Cynopithecus* (baboon and long-tailed monkey); (2) the later *Cynopithecus* (senile and proboscis-monkey); (3) early man-apes (gibbons); (4) later man-apes (orang-utan and chimpanzee); (5) ape-man (*Pithecanthropus erectus*, the Java man); (6) primitive man (*Homo primigenius*, Neandertal man); (7) *Homo sapiens*. Nevertheless, whether we agree or not with the phyletic hypothesis advanced by Haeckel for the elucidation of the human

genealogical tree in the course of fifty years, one thing must be granted—he opened up the question and interested the great educated public in it, eventually compelling even the churches to recognize its validity, while specialized science finally made it an integral part of specific anthropology.

Being rigorously consistent in his arguments, Haeckel naturally constructed his philosophy of life, his moral code, and his religion upon the foundation of his world-conception as formulated in his aforementioned “law of substance”: that we know nature in its entirety only as a system of moving forces which inhere in matter. Granted the truth of this premise, his monistic philosophy, culminating in his discourses on morality and religion, is logically correct. It is, therefore, not surprising that his extremely stimulating books dealing with these subjects and published within the last twenty or more years have found a multitude of readers throughout the civilized world and have been translated into many languages. *Homism as a Bond Between Religion and Science*, *Confession of Faith of a Naturalist*, *The Riddle of the Universe*, *Wonders of Life*, *The Problem of Man*, etc., all are stirring books which have aroused a flood of controversial literature. Some six years ago a Hindu professor visited Haeckel and asked his permission to translate *The Riddle of the Universe* into his native tongue, assuring him that the book would be sold in India in hundreds of thousands of copies, and the assurance was verified.

Haeckel denies all purpose or design in nature, the existence of a special vital force, moral order or human freedom. Moral life forms only a part of the cosmic unit; there are not two different worlds, a physico-material and an ethico-immaterial with an immaterial God, its creator, sustainer, and ruler. On the contrary, we can recognize only one substance in the universe which is at once “God

and Nature," not, however, in the sense of materialism which denies the existence of spirit, nor in the sense of spiritualism which rejects the notion of matter, but in the sense in which Spinoza—according to Haeckel—defines it: "Matter or infinitely extended substance, and spirit (energy), or sensitive and thinking substance, are the two fundamental attributes or principal properties of the all-embracing divine essence of the world, the universal substance." Haeckel's philosophy consequently recognizes only one single, all-comprehensive enigma, the "problem of substance," i. e., the inquiry into the real character of what the realistic scientist calls Nature or the Universe, the idealistic philosopher Substance or the Cosmos, and the pious believer Creator or God. To him it represents all the issues of life and death, of character and attainment; it is the great balm which brings consolation to the sorrowful and condemnation to iniquity.

But Haeckel acknowledges that the riddle cannot be solved: "The essence of substance becomes more mysterious and enigmatic the deeper we penetrate into the knowledge of its attributes, matter and force or energy, and the more thoroughly we study its countless phenomenal forms and their evolution. We do not know the 'thing-in-itself' that lies behind these knowable phenomena." Nevertheless, while he acknowledges the impossibility of solving the *problem* of substance he rejoices in the firm establishment of the *law* of substance, the fundamental law of the constancy of matter and force, the most far-reaching discovery of the nineteenth century, on which rests his monism of the cosmos, proving to his own mind that there is no personal God, no immortal soul, no free will. Hence, the universe is to him only a complicated machine in which vibrating atoms with their inherent forces of attraction and repulsion form the wheels that may now accumulate into a fiery sun and now into a beetle, that may now roll

as planets through the universe and may now cause man to act as a thinking and free being. From the gloomy *problem* of substance he thus claims to evolve the clear *law* of substance. He naturally assumes that the problem of the universe is a scientific problem and scornfully rejects the introduction of metaphysical methods.

Science, however, deals with facts and asks the question what is their nature and order of sequence, under what generalizations may the facts and their sequence be comprised, while the inquiry into the source and origin of the facts, the question why there is an experience at all and why the sequence presented therein is what it is does not concern science as such but is a metaphysical question. It is precisely this which constitutes the riddle of the universe. Professor Haeckel, notwithstanding, uses the same monistic key to unlock the mysteries of anthropology, psychology, cosmology, and theology, and since the key does not fit all these locks calmly breaks them. Man's relation to the rest of the world, the soul's relation to the body—soul to him is merely the sum of vital phenomena, i. e., of physiological nerve-processes—and the relation of all these to the cosmic substance are explained empirically or inductively, and upon a brilliant array of empirical demonstrations his monism, which constitutes the bond between religion and science, is deductively established. The law of substance manifests itself in the world as the law of evolution of the conservation of energy and matter, in the organic world as that of the evolution of matter, more specifically in the so-called psychic world as the law of the evolution of energy, in the moral world as the law of the supreme rule of energy over matter. Consequently, psychology is a part of physiology which legitimately employs observation, experiment, and deductive speculation, the psychic functions being dependent upon certain chemico-physical properties and subject to metabolic changes. All processes of psychic

origin belong therefore to the sphere of cellular physiology, and we may hence call the whole presentation a system of "Cellular Psychology." Consciousness, emotion, reason, and will are bound up with a reflex arc which consists of one-, two-, three-, and four-celled organs respectively, and are the result of gradual evolution of cellular development from the protists to man. Consequently, Haeckel explains the rise of the moral sense which he calls the essence of religion, as the gradual result of the apprehension of the useful, eventually becoming a necessity of peaceful social intercourse and finally leading to the recognition and observance of the true, the good, and the beautiful.

It seems as though Mendel's law of inheritance and the new science of genetics resulting from its application endorsed Haeckel's empiricism. For, it proclaims a mechanism of inheritance present in every cell which by its dominants and recessives determines the physical and mental qualities transmitted from parent to offspring. Consequently, the mechanistic view of life is to-day the prevailing principle of modern biological investigation. But such a conception will never lead to an appreciation of moral obligations. Haeckel firmly upheld it and organized thirteen years ago with enthusiastic fervor the "Monistic League" which is now presided over by Prof. Wilhelm Ostwald, the world-renowned founder of physical chemistry, who through his monistic *Sunday-sermons* has gathered a host of followers around the monistic banner.

But if we recognize a difference between the entities of time and space we must grant metaphysics as rightful a claim as science. Accordingly, the problem of substance belongs entirely to the sphere of metaphysics. The eminent botanist Johannes Reinke of the University of Kiel goes even farther when he says: "A knowledge of nature leads unavoidably to the idea of God, and we are, especially according to the laws of nature, in my opinion as sure of

the existence of God as we are of the existence of nature. Therefore the assumption of God is not fiction but induction."

Summing up our estimate of Haeckel, we must grant that he fought all his life honestly and untiringly for the highest ideals of humanity as he saw them; the enthusiasm which lifted the labors and results of his reason upon the plane of a pious faith and made them an affair of his heart places him far above the orthodox religious fanatics who in lock-step fashion follow ancient traditions.

Haeckel, the naturalist; Haeckel, the great apostle of Darwin and founder of genealogical classification; Haeckel, the inspiring teacher of a brilliant array of leading biologists; the master-type of man who on the stormy sea of life never lost his rudder—he surely will live on in the annals of the world's history: a fearless champion of academic freedom and religious liberty.

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